

Utilizing Conditional Expressions in MATLAB

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Abstract

MATLAB provides a standard set of conditional expressions, which can prove quite useful to us as electrical engineers. We can utilize these expressions to realize unit-step, dirac-delta and various other signals in the discrete domain.

1 Conditional Expression

A conditional expression in MATLAB is one which evaluates to a value of 1 or 0. A conditional expression is made using conditional operators. We have the following operators available:

$==$: $=$
 \neq : \neq
 \leq : \leq
 \geq : \geq

Let us implement some signals using the aforementioned operators.

Unit-Step

```
n = -5:1:5;  
% unitstep will return 1 (true) wherever n>=0  
unitstep = (n>=0);  
stem(n,unitstep);
```

Dirac Delta

```
n = -5:1:5;  
  
% delta will return 1 (true) wherever n is 0  
delta = (n==0);  
  
% The ^ symbol shows that the dirac delta is not an ordinary function.  
% Its height reflects the weight it carries, and not its amplitude.  
% The weight can be seen as the area it makes with the x-axis.  
stem(n,delta,'^');
```

We can also add two dirac-delta functions.

```
n = -5:1:5;

% fuse will return 1 (true) wherever n is either 2 or -2
% One can look at the + as an OR operation as well.
fuse = (n==2) + (n==-2);
stem(n,fuse,'^');
```

Unit Pulse

```
t = -5:0.01:5;
ampl = 1;

%pulse will return 1 only when t lies between -1 and 1
pulse = ampl*((t>=-1) - (t>=1));
plot(t,pulse);
```

Thus we saw the ease with which one can define discrete signals in MATLAB.

2 Drill Exercise

Implement the following functions in MATLAB;

1. Causal Ramp: $t u(t)$
2. Signal shown below:

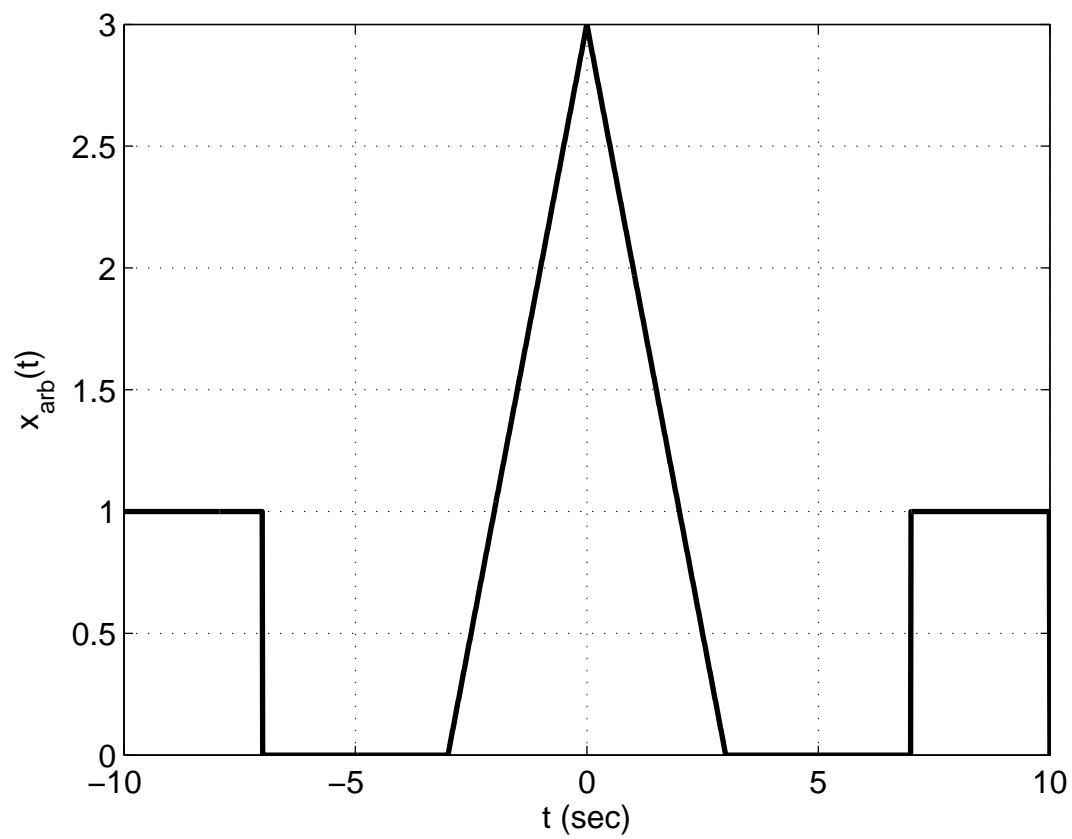


Figure 1: Arbitrary Signal